The Early Universe

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The Universe started as a very dense and hot ball. Quarks were appearing and disappearing for the smallest amounts of time. It was so extremely hot that matter and energy were the same thing both theoretically and physically. A little while later, Matter won over antimatter leaving us with almost only matter. Today we have all matter and almost no anti-matter. This continued until the universe grew slightly bigger due to cosmic inflation. This Inflation or expansion wasn't an explosion but rather a quick inflation. Moreover, the universe didn't expand into anything because there is 'nothing outside' the universe, the universe is all there is. The universe expanded into itself. This may be hard to visualize for us humans because, of the nature of our 3-dimensional Thinking.

Because of this inflation, several things happened, 4 forces were derived from a Universal law, those are the electromagnetic force, the strong nuclear force, the weak nuclear force, and the gravitational force. Quarks stopped the cycle of disappearing and being converted back into energy and, now we work with what we have. It was now cold enough for quarks to form pairs and create hadrons (such as protons and neutrons), but very few lasted long before collapsing. After some more inflation, it was now cold enough for protons to decay into neutrons releasing electrons. Now, all the sufficient particles were there to form the first atom, specifically a hydrogen-1 atom. More different atoms formed from the hydrogen atoms such as helium and lithium, while the universe kept expanding. After billions of years, hydrogen atoms started to collect together and gravity put them under pressure, forming stars and later on planets. To this day the universe hasn't stopped expanding and will probably never will.

But one thing remains undiscovered, the Universal law that existed during the Big Bang. To do so, we must combine all four forces, in a unified field theory. To get this, we have to combine Quantum Mechanics (which addresses all the nuclear and electromagnetic forces) with General Relativity (Gravitational force). This Quantum Gravity is sometimes called the Theory of Everything because, this theory could explain undiscovered laws, before the Big Bang and also give a complete explanation of how the universe works. But quantum mechanics doesn't go well with general relativity and is inconsistent together (Only one of them is right). The main problem is gravity, it is the only force quantum mechanics can't address. One theory that remains supreme is String Theory. String theory seems to be a good candidate for this theory of everything. String theory does this in more than 10 dimensions (rather than our 4-dimensional space-time) and 'curls up' these extra dimensions so we don't see them. String theory could curl up, these dimensions in many, many, different ways which leads us to many, different answers. Some regard this as string theory's biggest flaw. For now, A Theory of Everything seems further than ever.